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XXI. *An Account of some Observations relating to the Production of the Terra Tripolitana, or Tripoli. Humbly addressed to the Royal Society of London, by Martin Hubner, Fellow of the said Society, Professor of History in the University of Copenhagen, and Member of the Royal Academy of Inscriptions and Belles Lettres of Paris. Translated from the French, by Emanuel Mendes da Costa, F. R. S.*

Read June 21,
1759.

DURING a journey I made, in the autumn of the year 1755, through several provinces of France, principally in Britany, I made the natural history of that province, which has plenty of productions worthy the attention of a naturalist, one of the objects of my researches. The lead mines of Poullaën in the Lower, and those of Pontpean in the Upper Britany, employed me some time. The metallic veins in these mines are not only rich and regular, but also hold a great proportion of silver, which they do not extract with that profit, that might be done. In general, they could work these mines to greater advantage, if they were more skilful, or had proper machines, and above all others the fire engine, which is used with such success in the mines of Cornwall to drain off the water, that element being the greatest obstacle to the right working of the mines of Britany: but the advantages of this invention, glorious to its first discoverer, and useful

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to this nation, where it has been perfected, are yet so unknown in France, that there are even mechanicians in that kingdom, who seriously doubt, whether the fire engine is any-wise useful. I shall not here mention any thing of some rare and curious fossils found in Britany, nor of the square stones of a particular species, on the formation of which the late M. de Robier, president of the parliament of Rennes, who had a magnificent collection of natural history, employed his thoughts. I likewise shall pass over in silence the marbles and the plumb pudding stones, called in France *cailloux de Rennes*, from the vast quantities of them found in the neighbourhood of that city. The chief and only subject I propose in this dissertation, is the generation or production of the terra Tripolitana, or Tripoli, of which there are great quantities, and of the best kind, in Upper Britany. I more readily determine to give this illustrious Society an account of my observations on this subject, as not only the discovery I think I have made thereon is very curious, but also that the generation of this earth has been hitherto utterly unknown, no one having, to my knowlege, explained, before me, in what manner it is produced. It is true, I heard in France, that a young gentleman, a native of Britany, had wrote somewhat on this subject, and that his dissertation was to be inserted in a collection of miscellaneous papers, or loose pieces; but I never could see his said dissertation, nor know what it contained; therefore I am incapable of judging what it is.

In the mountain de Poligné, called by the Bretons *le Tertre gris*, i. e. the grey hill, I think I have discovered the true origin of Tripoli. This mountain,

the Breton name whereof is manifestly derived from the greyish colour of its summit, is situated in Upper Britany, near the inn of Roudun, on the road from Rennes to Nantes, a small league wide of Baro, and five leagues from Rennes. Observations and experience are the only means, that can conduct us to certain knowledge in natural history; and it is conformable to that axiom, that I mean, simply, to lay before the Society what I observed in that mountain, relating to the generation of Tripoli, and, at the same time, to produce also the most authentic documents of nature, in order to prove, that the terra Tripolitana, or Tripoli, is probably only *a wood wholly petrified, and afterwards calcined by the subterraneous fire.*

To give more weight to what I propose, and to establish this assertion, it will be necessary to observe here, that the mountain of Poligné, in the interior of which the Tripoli is found, has been, and is perhaps yet, a volcano. Its colour, its form, its fissures, and its strata, prove it; and the inhabitants of the neighbourhood declare, that they have formerly seen fire on its summit at night; but that, however, for many years past, they have not perceived any more. This being granted, I have only now to give an account of what is to be observed in the mountain itself, and to produce specimina of the different strata of earth found therein, to ascertain the truth of my thesis.

The stratum of the true Tripoli, intirely calcined, lies from 50 to 60 feet depth; the sample of it here produced is marked N^o 1. This stratum is white; but it sometimes has a cast of grey, and sometimes is of a reddish hue, as the sample itself shews. It is quite or fully calcined and converted into Tripoli, because it
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lay near to the subterranean fire of the volcano, so as to be violently affected by it.

The stratum above this, of which N^o 2. is a sample, is already much burnt and calcined, but not enough to be whitened, having lain too far from the violence of the subterraneous fire to be freed intirely from its heterogeneous and combustible parts, inso-much that the fire has left it quite black.

The small layer or stratum, which follows, that is, lies above it, or overlays the last, and of which N^o 3. is a small sample, is yet yellowish, verging on brown; and altho' the burning is easily seen on the extremities, and the effect of the fire in the interior part of the layer, yet it is easily to be understood, that it is the weakness of the fire incapable of reaching it with a force necessary to calcine it, that has put it and left it in this state of imperfection. When one views this sample narrowly, vestiges, which appear pores of a wood, are easily discovered.

The next layer shews the same thing, but more clearly: the pieces marked N^o 4. are samples of it. This layer has been less attacked by the fire than those under it; nevertheless the lightness of the substance shews, that it is already a little calcined, and the sight alone clearly demonstrates the resemblance of its pores to those of wood.

The piece taken from the fifth stratum, and marked N^o 5. confirms this same observation. It is more weighty in proportion than all the others, because it is less calcined; and indeed it is less calcined, only because it was the farthest distant from the subterranean fire, and thereby has suffered less, as I have observed before. However, its ends or extremities evi-

dently prove the action of the fire even on this higher or upper stratum ; and its interior parts likewise prove as evidently, that this substance has been formerly petrified wood, but from which the ligneous parts have been driven away, and consumed by a heat superior to their resistance.

I do not doubt, but had my time permitted me to make further researches, I should have found in the mountain pieces of petrified wood not yet altered or destroyed by the action of the fire ; but my leisure not answering to my wishes, I thought I might remain contented with what I have now the honour to present to the Society, and which seems to me sufficient to determine the process of nature in the generation or production of Tripoli.

If I am asked how all this vast quantity of wood could be heaped or gathered together in this mountain? I answer, 1°. That it is not to be supposed that the several layers or strata of Tripoli, perfect or imperfect, follow each other without any interruption. 2dly, It may be allowed me to suppose a deluge, whatever it was, and which has covered many parts of our globe, to accumulate here all this wood, and even aid its petrification. 3dly, A further proof of my assertion is the wood-coals *, which incontestably are found deep in the earth ; for there are intire quarries of them in Saxony, in the neighbourhood of Halle, and which do not suppose a less quantity of wood : besides, it is useless to dispute against observation and experience, when they are solidly established.

* Wood-coals. The author uses the words " charbons de bois ;" but what he means by his intire quarries of charbons de bois, I declare myself ignorant of.

I must here further observe, that the volcano of Poligné did not, perhaps, cease to flame on the upper part of the mountain, till after the ligneous parts of the wood buried in it ceased to furnish the pabulum necessary to the fire.

I shall be happy, if these observations merit the approbation of this illustrious Society, to whom I have the honour to dedicate them ; but, however, am delighted, that they procure me an occasion of testifying my zeal for this respectable and learned body, in communicating to it all observations, which appear to me useful.

However, I do not absolutely pretend, that all Tripoli is a wood, wholly or *per totum* petrified, and afterwards calcined by the subterraneous fire. There are Tripolis of many kinds, as well as of several degrees of goodness ; and among these there may be such, as are not otherwise than a real or native fossil, deprived by fire of its primitive hardness and weight : but yet I believe, that the Tripoli, which has its origin from a petrified wood, must be the best, because naturally it ought to be the finest, softest, and the best calcined.

London, 8th Octob. 1757.

Remarks on Mr. Hubner's Paper on Tripoli.

HE is of opinion, that the different strata, marked in his specimina N^o 1, 2, 3, 4, and 5. are all the same, only under different degrees of calcination. But N^o 2. seems to differ from the rest, as it looks like mere charcoal, and appears to be very little, if
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at all, petrified or saturated with extraneous particles ; I would therefore propose, not only that this N^o 2. should be further calcined, in order to be satisfied, whether it will, by that means, come to be of the same nature with N^o 1. but likewise that the following N^o 3, 4, and 5. which Mr. Hubner supposes to be less calcined, should undergo the same trial, in order to observe, whether they will by that means become Tripoli ; also to know, whether by being calcined for some time (before they are reduced to tripoli) they will put on the appearance of a coal like N^o 2. for, if they do not, as I suspect may be the case, it will be little less than a proof, that N^o 2. which seems the plainest wood of any, differs from the others more essentially than merely in its degree of calcination. Perhaps it may also be found, that N^o 3, 4, and 5. differ not only from N^o 2. but likewise from N^o 1. and may not be capable of being reduced to Tripoli.

Remarks on the preceding Paper : In a Letter to the Right Honourable the Earl of Macclesfield, Pres. R. S. from Mr. Emanuel Mendes da Costa, F. R. S.

My Lord,

Read June 21, 1759. **Y**OUR Lordship's commands to wait on Mr. Professor Hubner, when in England, to receive his paper on the production of Tripoli, which he designed for the Royal Society, and to discourse with him thereon, in order to translate it,
and

lay it before this illustrious body, I accordingly obeyed ; and the inclosed is the said paper. My avocations, which now absorb many hours I formerly dedicated to study, have been the only cause, my Lord, that I have detained it so long ; I therefore hope for your Lordship's and the Society's pardon.

When I first undertook the translation, I had thoughts of giving my opinion thereon, not only by reasoning, but also by experiments. Time, my Lord, has not permitted me to do so ; and since, having seriously reflected, that Mr. Hubner, in his last paragraph, turns his intire system into a partial production of one species of Tripoli, I think it unnecessary to trouble your Lordship, or the Society, with any arguments pro or con. I shall only observe, that it is not improbable but some of Mr. Hubner's Tripoli, as he surmises, may have been produced from the petrified wood he found in the mountain ; and the whole account is then reduced to this only circumstance, that the layers of fossil wood in this mountain, having been saturated with the Tripoline particles, which likewise abound in the same mountain, thereby composed a stone, or third body ; and that afterwards these Tripoline particles were again reduced, by the effects of a subterraneous fire, to their pristine state ; the force of the fire destroying the compages of the third body, or stone.

Had the wood, my Lord, been saturated with any other metallic mineral, or earthy particles, I believe every judge of science will determine, that the calcination of petrified wood, alone, could never have changed it into Tripoli.

I have, in my history of fossils, p. 76. 85. and 87. described five kinds of the Tripoli earth ; and Mr.

Hubner's kind, here mentioned, is only a variety of that I call *creta*, *tripela alba dicta*, p. 76. N° 1. Your Lordship will please to observe, that of all the said kinds none are produced in general by any such operations of nature, as Mr. Hubner intimates ; therefore, my Lord, reason will convince, that this is only a partial and local origin of his Tripoli, by concurring circumstances of wood and Tripoli buried together in the bowels of a volcano ; for as we find this very species elsewhere produced without such circumstances, it is certain they are not the sole efficient causes of its production.

I am, with great submission and respect,

My Lord,

Your Lordship's most devoted,

most obliged, and most obedient

humble servant,

Bearbinder Lane,
19 June, 1759.

Emanuel Mendes da Costa.

XXII. *A remarkable Case of an Empyema.*

By Mr. Joseph Warner, F. R. S. and Surgeon to Guy's Hospital.

Read June 28, 1759. **M**ORRIS EVANS, aged 30 years,

on the 13th of March, 1759, was admitted into Guy's hospital, with a remarkable complaint in his chest, which attacked him in the month of August 1758, with the symptoms of a pleurisy. Upon